US Particle Accelerator School

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August 1, 2003

Dear Colleague,

I am pleased to announce that the College of William & Mary will sponsor the next USPAS program in Williamsburg, Virginia from January 19 – 30, 2004

We will offer 5 two-week and 6 one-week courses at this program. All courses, except the accelerator fundamentals course, will be graduate-level courses. As always, the two standard courses on ***Fundamentals of Accelerator Physics and Technology with Simulations and Measurements Lab*** (undergraduate level) and ***Accelerator Physics*** provide the backbone of education in accelerator physics. We strongly recommend that you take the fundamentals course before taking more advanced courses, unless you have an equivalent accelerator physics background. Due to the great popularity of the laboratory exercises during the last fundamentals class, we will include this lab component again.

Since a linear accelerator is part of most every accelerator system, we continue to provide an introduction into ***Microwave Linear Accelerators***. As accelerator developments progress, higher and higher beam currents are desired, offering their own problems and phenomena. A course on ***Intense Beam Physics: Space-Charge, Halo, and Related Topics*** will address such issues in detail.

On a more theoretical note, understanding and treatment of beam dynamics problems and issues depends heavily on theories developed in classical mechanics and electromagnetism. A course on ***Classical Mechanics and EM for Accelerators and Beams*** is designed to provide a solid foundation of beam dynamics.

These two-week courses are accompanied by 6 one-week courses on special topics including a course on ***Ion Injectors for Accelerators*** and on ***Plasma Physics Concepts in Beams.*** Continued emphasis is given to microwave systems and phenomena with a course on ***RF Engineering and Signal Processing*** to address issues of low level rf and a course on ***Microwave Sources.***

Hardly any high technology system can be pursued without the use of high vacuum technology. A hands-on course on ***Ultra High Vacuum Physics and Technology*** is designed to provide a thorough background and introduction into this technology.

Finally, we are offering a course on ***Medical Applications of Accelerators***, which provides insight into the functioning of an accelerator in a real environment.

I sincerely hope that this program will address your needs and interests. Please complete the enclosed application form and return it to the USPAS Office before October 24, 2003. More information on these courses and other USPAS activities is available on our website at http://uspas.fnal.gov .

I look forward to seeing you in Williamsburg,

Helmut Wiedemann

Helmut Wiedemann, Director
US Particle Accelerator School

US Particle Accelerator School
sponsored by The College of William and Mary
to be held in Williamsburg, Virginia
Monday January 19 - Friday January 30, 2004

Course Descriptions

Two-week full courses (January 19-30, 2004)

Fundamentals of Accelerator Physics and Technology with Simulations and Measurements Lab
(undergraduate level)
WM equivalent of 3 semester hours of undergraduate credit
Louis Emery and Nick Sereno - APS/ANL
This course gives an introduction to accelerator physics and technology. Formal chalk-and-blackboard-type lectures will be given in the mornings and lab modules in computer simulations and other measurements (developed over several offerings of the course by H. Wiedemann) will be given in the afternoon. The lectures will start with a survey of the most common accelerator types and an introduction to particle beam dynamics. We will derive formalisms for particle beam bending and focusing. The concepts of orbit, beam emittance, betatron functions and envelope, dispersion, tunes, natural chromaticity with its correction and beam stability will be covered. As emphasis will be on electron accelerators, synchrotron radiation effects, which describe the dynamics of individual particles and beam, will be covered. A discussion of beam interaction with accelerating fields will lead to the understanding of longitudinal motion, synchrotron oscillations and energy acceptance. Some practical topics such as the process of injection and accumulation will be discussed. An introduction to magnet alignment and field errors will convey a feeling for tolerances followed by a description of beam monitoring, orbit measurement and correction.

The hands-on afternoon program is meant to solidify the understanding of some of the morning topics. The computer lab modules cover the simulation of magnets with saturation, the design of a beam transport system, rf-cavities and ultra-high vacuum systems. Equipment for actual magnetic field measurements on a bending magnet, quadrupoles and undulator magnet will be made available to compare simulations with results of real magnet field measurements. Other equipment allows the measurement of various quantities on an rf-cavity and comparison with theoretical and computer-simulated results. Similar exercises will be done with a beam current and position monitor as well as an introduction to the use of a lock-in amplifier. *Prerequisites: a course in Mechanics and Electromagnetism.* Textbook to be provided: Particle Accelerator Physics I & II by Helmut Wiedemann (2nd edition, 2nd printing, Springer-Verlag, 2003)

Accelerator Physics
WM equivalent of 3 semester hours of graduate credit
Lee Teng and Vadim Sajaev, ANL
This is a graduate-level introductory course on the physics, technology, design and operation of particle accelerators. The course will begin with a brief historical introduction to the needs, the concepts and the R&D of various types of accelerators. Contents of the course will include first, the single particle dynamics both longitudinal (acceleration, phase stability) and transverse (steering, focusing, dispersion). Both linear and non-linear motions will be studied and the use of maps will be presented. Next, for beam dynamics (multi-particle dynamics) we first introduce the concept of the emittance and study the various emittance raising or lowering processes. We, then, discuss the effects caused by the charge and current of the beam, namely, space-charge detuning, coherent beam instabilities (wakefield, impedance), and such special effects as beam-gas scattering, intra-beam scattering, Touschek effect, and beam-beam interactions in colliders. Thirdly, the radiative process of the beam (synchrotron radiation) and the beam-radiation interaction will also be studied in detail. Lastly, an

interesting and essential topic is the physics and designs of hardware components such as magnets and rf-cavities (both normal and superconducting), vacuum systems, beam diagnostics, manipulations and controls systems, and error effects & corrections will also be discussed. However, depending on time it may not be possible to cover all these topics. On the other hand, if time allows, a discussion of the future prospects of accelerator R&D can also be included. *Prerequisites: Classical Mechanics and Electrodynamics, and working knowledge of analytical geometry and calculus. Previous course in "Accelerator Fundamentals" or equivalent is advisable.* Textbook to be provided: Particle Accelerator Physics I & II by Helmut Wiedemann (2nd edition, 2nd printing, Springer-Verlag, 2003)

Microwave Linear Accelerators
WM equivalent of 3 semester hours of graduate credit
David H. Whittum, Varian Medical Systems
Microwave linear accelerators are introduced starting with the principles of acceleration, accelerating structures, and microwave electronics as applied to the accelerator circuit. Structure modelling and design are developed from an elementary point of view, with CAD lab exercises for illustration. Topics include quality factor, [R/Q], shunt impedance, loss factor, VSWR, Slater's theorem, external coupling, cell-to-cell coupling, Brillouin curve, tuning errors, tuning, tolerances, field-symmetry. The behavior of standing-wave and travelling-wave structures is analyzed on and off resonance, in cold test, and in operation with beam loading. Additional topics will be touched on as they influence linac design including rf systems, instrumentation, beam dynamics, wakefields. Illustrations and exercises will be drawn from practical problems in industrial, medical and high energy physics applications. *Prerequisites: Vector Calculus, Electrodynamics.*

Classical Mechanics and EM for Accelerators and Beams
WM equivalent of 3 semester hours of graduate credit
Helmut Wiedemann, Stanford University
This course is designed to guide the student through some advanced treatments of particle dynamics. We start with the Vlasov equation to describe the evolution of an ensemble of particles, while elucidating Liouville's theorem, symplecticity and damping. Simultaneously, we arrive at the need for Hamilton's equations which we derive from general principles. Conjugate coordinates and canonical transformations are introduced as a means to extract particle dynamics free of already known quantities. A canonical transformations in particle beam dynamics, for example, can reveal the structure of one-dimensional and coupling resonances. Proceeding along this line, we enter Hamiltonian nonlinear beam dynamics and derive from Hamiltonian Perturbation theory higher-order tune shift, which is of particular interest in accelerators employing sextupole fields. Expanding on the Vlasov equation we introduce the Fokker-Plank equation to deal with statistical processes.

Interaction of particles and electromagnetic fields is introduced on a very basic level to extract the character of this interaction. Emission/absorption of EM energy by charged particles can be described either as a Cherenkov or Compton interaction. Emission of synchrotron radiation is introduced as a consequence of the finite velocity of light. To transform from the particle system to the laboratory system we introduce the Lorentz transformation and 4-vector analysis. Relativistic Doppler effect and forward collimation of synchrotron radiation from high-energy charged particles results automatically from such transformations. We derive the nature of undulator, wiggler and bending magnet radiation and discuss briefly the dynamics of a free electron laser and of a single pass FEL. Finally, we discuss some more unconventional femtosecond x-ray sources by Thomson scattering from femtosecond electron bunches, or through interaction of such bunches with periodic structures on a nano- or crystalline scale and discuss the generation of coherent transition radiation.
Prerequisites: Basic understanding of beam physics, general university course on classical mechanics and EM. Textbook to be provided: Particle Accelerator Physics I & II by Helmut Wiedemann (2nd edition, 2nd printing, Springer-Verlag, 2003).

Intense Beam Physics: Space-Charge, Halo and Related Topics
WM equivalent of 3 semester hours of graduate credit
John J. Barnard and Steven M. Lund, LLNL
This course will be an introduction to the physics of intense charged particle beams, focusing on the role of space charge. The topics include: particle equations of motion, the paraxial ray equation, and the Vlasov equation; 4-D and 2-D equilibrium distribution functions (such as the Kapchinskij-Vladimirskij, thermal equilibrium, and Neuffer distributions), reduced moment and envelope equation formulations of beam evolution; transport limits and focusing methods; the concept of emittance and the calculation of its growth from mismatches in beam envelope and from space-charge non-uniformities using system conservation constraints; the role of space-charge in producing beam halos; longitudinal space-charge effects including small amplitude and rarefaction waves; stable and unstable oscillation modes of beams (including envelope and kinetic modes); the role of space-charge in the injector; and algorithms to calculate space-charge effects in particle codes. Examples of intense beams will be given primarily from the ion and proton accelerator communities with applications from heavy-ion fusion, spallation neutron sources, and/or tritium production. *Prerequisites: Undergraduate Electromagnetism and Mechanics. Some familiarity with basic accelerator concepts and plasma physics is recommended but not required.* Course outline can be found at http://uspas.fnal.gov/programs/w&m/IBP.htm

One-week half courses (January 19-23, 2004)
Students must take one course each week to earn credit from the College of William and Mary

Ion Injectors for Accelerators
WM equivalent of 1.5 semester hours of graduate credit
Martin Stockli, ORNL
This course is designed to give an introduction to the physics and technology of ion injectors. Ion injectors use an ion source that produces the desired ions, which then are extracted to form an ion beam. The ion flux describes the intensity of the ion beam while its emittance describes its focusability. The low-energy beam transport system shapes the beam for proper injection into an RFQ or a LINAC. Pulsing and chopping can be used to achieve the desired time structure of the ion beam. The course starts with an introduction to low-pressure discharges and to vacuum to understand the basic limitations of ion sources. Ion sources for positive-, negative-, and highly-charged ions are discussed in more details. Some plasma physics is presented to understand the ion extraction process. Beam current and emittance measurements and analysis are discussed in detail. Transport properties of ion optical elements are discussed to understand the transport and shaping of the ion beam. Ion beam modulations through ion source pulsing and/or electric choppers are discussed. *Prerequisites: College physics and first-year calculus highly desirable. Familiarity with computers is useful, but not mandatory.* Textbook to be provided: "Ion Sources" by Huashun Zhang (Science Press-Springer, 1999).

Microwave Sources
WM equivalent of 1.5 semester hours of graduate credit
Bruce Carlsten, LANL
This course will be taught at a level suitable for a first-year graduate student. The purpose of this course will be to provide a solid foundation for understanding how common microwave devices work, particularly those associated with driving accelerators, and how to predict device gain and efficiency. Three general topics will be covered - (1) beam physics relevant for microwave tubes, (2) standing-wave amplifiers, and (3) traveling-wave amplifiers. The beam physics material will include topics on magnetic focusing and space-charge forces, such as Busch's Theorem, solenoidal and PPM focusing, diamagnetic effects, potential depression, space-charge waves, balanced flow, confined flow, and Brillioun flow. A paraxial optical theory for halo description will be given, and stable sheet beam transport will be included in these discussions. A detailed analysis of how a klystron works will be used as an example of a standing-wave amplifier. A beam/cavity interaction model based on induced current will be presented. Students will have an opportunity to write a simplified klystron

simulation code (neglecting space-charge effects) in the computer lab. A Pierce-type traveling-wave tube analysis will be presented, which will be used to describe a common helix traveling-wave tube, a sheet beam traveling-wave tube, and a dielectric Cherenkov maser, and a free-electron laser. Selected unconventional sources and non-accelerator applications will be surveyed. *Prerequisites: a course in Electromagnetism and Calculus.*

Ultra High Vacuum Physics and Technology
WM equivalent of 1.5 semester hours of graduate credit
Louis R. Bertolini, LLNL
This course is an introduction to the engineering, design, and testing of high vacuum and ultra-high vacuum systems for accelerators. Topics include a survey of vacuum pumping schemes, design of custom vacuum pumps, vacuum diagnostics, materials, methods of vacuum chamber construction, handling, and vacuum processing. We will discuss the role of gas desorption and pump speed experiments in the design process. Vacuum system supports and alignment techniques will also be described. A variety of computational tools will be described and utilized in classroom design exercises. *Prerequisites: some familiarity with Thermodynamics and Material Science.*

One-week half courses (January 26-30, 2004)
Students must take one course each week to earn credit from the College of William and Mary

Plasma Physics Concepts in Beams
WM equivalent of 1.5 semester hours of graduate credit
Patrick Colestock, LANL
This course gives an introduction to plasma physics for accelerator scientists wishing to explore the common physical basis of these two fields. The basic characteristics of a plasma will be described and compared to comparable phenomena inherent in both low-energy and high-energy beams, including Debye shielding, plasma oscillations, wave propagation, and stability. Moreover, the powerful theoretical methods developed in plasma physics will be developed to describe linear collective effects such as Landau damping, weakly nonlinear effects such as quasi-linear diffusion, mode saturation, echoes and weak turbulence, as well as strongly nonlinear effects commonly observed in beams such as solitons. Topics will be developed both in a formal manner mathematically with specific examples taken from actual experiments. In addition, a brief introduction to plasma physics applications for modern accelerators will be covered, including plasma acceleration, plasma focusing, and plasma-based light sources. No previous experience in plasma physics is required. *Prerequisites: Accelerator Physics, Classical Mechanics, complex variables and Electromagnetism.*

RF Engineering and Signal Processing
WM equivalent of 1.5 semester hours of graduate credit
John D. Fox, SLAC/Stanford University
This course will consist of two parts - a technical introduction to RF circuitry and signal processing techniques, followed by example implementations of RF processing and control functions as used in several particle accelerators. The course assumes some level of familiarity with circuit fundamentals, and will cover electromagnetic wave fundamentals, transmission lines, S-parameters, impedances, resonators and key RF processing components (such as hybrids, circulators, waveguides, mixers, diode detectors, etc.). Important signal processing concepts, including modulation, heterodyning and quadrature (I&Q) processing will be presented. The course will attempt to stress both frequency-domain descriptions as well as time-domain descriptions of these circuit elements and behavior. The second portion of the class will examine the system implementations of several linac and storage ring RF systems, as well as look at the detailed implementation of several important accelerator instrumentation problems (such a beam position monitor signal processing, broadband feedback systems) that rely on RF signal processing systems.

Medical Applications of Accelerators and Beams
WM equivalent of 1.5 semester hours of graduate credit
Jacob Flanz, Mass General Hospital and Harvard University
This course discusses the applications of beams in medicine and explores the accelerator designs used to produce them. The relevance of beams to medicine has been recognized from the time that particles were discovered. We will discuss how to prepare these beams appropriately for a variety of clinical uses, including the flow down from the application specifications to the parameters of the accelerator and beam delivery equipment. Machine design parameters and tolerances will be derived for linacs, rings, cyclotrons and beamlines. Applications include diagnostic medicine, medical radiation oncology, and material process for medical uses. Some introductory familiarity with accelerator systems will be assumed. *Prerequisites: a course in Accelerator Fundamentals or Accelerator Physics.*

Application Form

US Particle Accelerator School sponsored by the College of William and Mary
January 19-30, 2004
held in Williamsburg, Virginia

Name _____

Institution _____

Address _____

_____

Country of citizenship: _____ Country of residence: _____

E-mail address and fax number _____

Background: highest degree held: _____ degree expected, if any _____

To be eligible for credit from the College of William and Mary, students must attend both weeks of the USPAS. Please choose from the following:

Two-week full courses: January 19-30, 2004

___ Fundamentals of Accelerator Physics and Technology with Simulations and Measurements Lab (undergraduate level)
___ Accelerator Physics
___ Microwave Linear Accelerators
___ Classical Mechanics and EM for Accelerators and Beams
___ Intense Beam Physics: Space-Charge, Halo and Related Topics

OR **Half courses: January 19-23, 2004**

___ Ion Injectors for Accelerators
___ RF Engineering and Signal Processing
___ Ultra-High Vacuum Physics and Technology

AND **Half courses: January 26-30, 2004**

___ Plasma Physics Concepts in Beams
___ Microwave Sources
___ Medical Applications of Accelerators

Financial support is limited and is typically restricted to university students. ***A resume and letter of recommendation are required.*** Students receiving financial support must share housing and are expected to complete their course for credit.

No financial support requested _____

Registration fee requested _____

Room, half-board & registration fee requested _____

The registration fee is $700.00 if this application form is received by October 13, 2003; after October 13, the fee is $800.00. A limited number of standard single rooms will be available for $59.00 per person per night plus tax. Otherwise superior- and deluxe-level single rooms will cost $79.00 per person per night plus tax. Double rooms will be available for $39.50 per person per night plus tax. Breakfast and dinner will be included.

Send this form by October 13, 2003 to:

US Particle Accelerator School
Fermilab, MS 125
Kirk Rd. and Wilson St.
P.O. Box 500, Batavia, IL 60510

phone (630) 840-3896
fax (630) 840-8500
e-mail: uspas@fnal.gov
http://uspas.fnal.gov

General Information for USPAS/The College of William & Mary
Held in Williamsburg, Virginia
(information as of October 2003)

You have been accepted as a student at the USPAS program of courses sponsored by The College of William & Mary. Classes will be conducted at the Williamsburg Lodge beginning on Monday, January 19, 2004 through noon on Friday, January 30, 2004. To earn credit, students may complete one of the 2-week courses offered January 19-30 ***OR*** one half-course January 19-23 ***AND*** one half-course January 26-30. All students receiving USPAS financial assistance are required to take courses for credit.

All courses will be conducted at the Williamsburg Lodge Mondays through Fridays from 0900 until 1200 hrs., and afternoons for about 2.5 hrs. at the discretion of the instructor(s). On Friday, January 23 courses will be in session all day, however, on Friday, January 30 they will end at 1200 hrs. and the USPAS Office will close. Classroom assignments will be included in information at USPAS check-in at the Williamsburg Lodge, (310 South England Street, Williamsburg, VA 23185) on Sunday, January 18, 2004.

Please complete the enclosed registration/enrollment forms and return them to the USPAS Office (Fermilab/MS125, Kirk & Wilson Streets, Batavia, IL 60510), along with payment (if applicable) in the form of a check or by providing credit card information, no later than December 8, 2003. International students please note advice on visas below.

Your housing reservation should be made by completing and submitting the enclosed form to Complete Conference Coordinators as directed on the bottom of that form; please pay special attention to the one-night deposit requirement.

Registration/Academic Status

The USPAS program is composed of courses conducted through The College of William & Mary as part of their program between January 19 and January 30, 2004 only. **International students traveling to the U.S.** are strongly encouraged to consult the nearest American consulate about the suitability of a visitors visa for this purpose. Neither the College nor the USPAS will issue I-20 forms for this program since it is not part of a course of full time study in the U.S. In addition, **international students currently in the U.S.** in a valid immigration status (F1 or other valid non-immigrant status) may enroll in these courses, but they should also consult with their international student advisor about attending the courses in Williamsburg, Virginia.

USPAS students approved for financial assistance are expected to successfully complete courses for credit. Students not receiving financial assistance from the USPAS will need to confirm their choice to take courses for credit or audit on or before Wednesday, January 21. Official transcripts will be maintained by The College of William & Mary.

Matriculating W&M students who wish to participate in the USPAS program are asked to complete and submit the enclosed forms to the USPAS.

All students should bring a calculator but leave their cell phones at home!

Accommodations

A block of rooms has been reserved for USPAS participants at the Williamsburg Lodge in Colonial Williamsburg at a rate of $59/single/standard room/night + 9.5% tax **or** $79/single/deluxe room/night + 9.5% tax per night, **or** $39.50/double room/night + 9.5% tax for each of 2 people per room. Note that the same room rates for dates 3 days before and 3 days following the program are based on hotel availability. To guarantee that you receive our group rate, complete the enclosed Housing Reservation Form. Return that form to Complete Conference Coordinators with the required deposit (as directed on the form). ***All reservations require a one-night deposit.*** No charge will be made to your credit card unless you fail to cancel your reservation as directed on the form, i.e., **48 hrs.** in advance of your scheduled arrival. If your deposit is made by check, it will be credited to your stay or it will be refunded if cancellation is made before the deadline.

If your accommodations are being paid for by the USPAS you must also complete the enclosed Housing Reservation Form. A guarantee by credit card or by a check in US dollars **is required** to make a reservation; this is only a guarantee. After your arrival, the room charges for your shared accommodation will be paid directly by the USPAS and your deposit (if made by check) will be returned to you. If your guarantee is made by credit card and you arrive as scheduled, no room charges will be put on your card. In the event your plans change or if you cancel your reservation **at least 48 hrs. in advance** of your scheduled arrival, you will not be charged. It is important that you modify the form if your travel plans do not match the form; note that some date changes may make you responsible for payment, e.g., if you arrive earlier than or stay later than School dates. Also, if you are scheduled to have a roommate and one does not appear, notify the USPAS Office the following morning so that rooms can be reassigned if necessary. Otherwise you may be responsible for room charges. Supported students are also advised that the hotel will require a credit card or cash deposit upon arrival to guarantee payment of any

personal charges to your room which are not included in USPAS financial support; these charges would include telephone calls, room service, restaurant charges, in-room movies, etc.

The Williamsburg Lodge rooms include a clock radio/alarm, a hair dryer, and an iron and ironing board. There's a golf course, two outdoor pools, eight tennis courts and there is a fitness room and an indoor heated pool at the Tazwell Club Fitness Center. There is also an on-site bicycle rental company. Please be aware that the hotel may impose access and service charges in addition to time charges for phone calls even for credit card or 800-number calls, so it is wise to confirm applicable charges from your sleeping room before making calls. There are pay phones located around the hotel which will be much more economical.

Check out the historical places of interest in Williamsburg for your free time exploring; the Williamsburg Lodge is adjacent to the downtown Colonial Williamsburg Historic Area! Visit www.colonialwilliamsburg.com for information.

On-site Check-in

On-site check-in will be held on Sunday, January 18, 2004 from 1700 till 2100 hrs. in the North Ballroom at The Williamsburg Lodge (310 South England Street, Williamsburg, VA 23185; Phone 757-229-1000, X4008) along with food and refreshments. If you arrive after hours, the USPAS will leave some information for you at the front desk of the Lodge; you should still check in with the USPAS Monday morning, January 19 at the USPAS Office (Room H). If you are scheduled to arrive for classes the second week only (January 26-30), information will be left for you at the hotel front desk so that you know when and where meals will be served, what your classroom assignment is, and to remind you to check in with the USPAS staff Monday morning of the second program week. The USPAS Office (Room H) will be open weekdays beginning Monday, January 19 during normal working hours.

Transportation/Parking

Norfolk, Newport News-Williamsburg, and Richmond International Airports are all close to Colonial Williamsburg. Each has rental car and limousine or shuttle service.

Amtrak serves the Williamsburg Transportation Center with a connecting train from Washington, D.C. The center is just blocks from the Historic Area and provides car rentals, a cab stand, and Greyhound Bus connections.

If you're driving from the Richmond airport, get on Interstate 64E. Take exit 238 onto Route 143 East. Follow Route 143 to the second traffic light and bear right onto Route 132 (Henry Street). Continue on Henry Street through the Historic Area. At the third traffic light, turn left onto Francis Street. Turn right on the second street (South England); the Lodge is immediately on the right.

From Byrd Field in Richmond, VA you can use Groome Transportation to get to the Lodge (800-552-7911); the cost is $34/person/one way.

From Newport News/Williams Airport you can use the Williamsburg Limo service (757-877-0279) for $25/person/one way or Yellow Cab (757-220-1900) for $35/person/one way.

From Norfolk you can use the Williamsburg Airport Shuttle (757-218-9539); the cost is $50/person/one way.

Parking at the Williamsburg Lodge is free.

Food

Included in your registration fee are breakfasts January 19 through January 30 from 0800-0900 hrs., and dinners January 18 through January 29 at 1800 hrs., i.e., every day of the program including the weekend (January 24 and 25). Participants are on their own for lunch; there are a variety of choices for lunch in the area. At the Lodge the Bay Room and Café is open for lunch and serves a bistro-style menu. The Lodge is also within easy walking distance to 10 restaurants. A breakfast/dinner meal package may be purchased for an accompanying person; see the USPAS staff. Breakfast is $10/person/day, dinner is $25/person/day.

Study/E-Mail

A study area will be available in the North Ballroom of the Williamsburg Lodge every evening from 1900 until 2400 hrs. starting on Monday, January 19 through Thursday, January 26.

Access for checking your e-mail will be available in the Computer Lab at the Lodge when classes are not in session. A wireless router will also be available.

Weather

Temperatures in Williamsburg in January are average highs of 49°F/9.4°C during the day to average lows of 28°F/-2.2°C in the evening.